

Patent Claims

1. Method for determining the state of a measuring field-device for process automation and process measurement technology for registering at least one process variable of a process medium, which method is characterized by the following method steps:

a) Registering at least one influencing variable influencing expected service life, or ability of the measuring field-device to function, wherein the influencing variable is not the process variable;

b) comparing the measured influencing variable, or a variable derived therefrom, with a predetermined maximum, or minimum, allowable value for this influencing variable or the derived variable; and

c) generating and issuing an alarm signal in the case of exceeding of the maximum allowable value, or in the case of subceeding, or falling beneath, the minimum allowable value, of the influencing variable or the derived variable.

2. Method for determining the state of a measuring field-device for process automation and process measurement technology for registering at least one process variable of a process medium, which method is characterized by the following method steps:

a) Registering at least one influencing variable influencing expected service life of the measuring field-device, wherein the influencing variable is not the process variable;

b) determining probable service life of the measuring field-device, or remaining period of time until the reaching of a point in time for maintenance work, by means of a predetermined function and on the basis of the currently registered influencing variable;

c) producing and issuing a report signal, which corresponds to the probable service life of the measuring field-device or the remaining period of time until the reaching of a point in time for maintenance work.

3. Method as claimed in claim 1, characterized in that the alarm signal is issued by an alarm, or display, apparatus on, or in, the measuring field-device.

4. Method as claimed in claim 1, characterized in that the alarm signal is issued by a corresponding apparatus from the measuring field-device onto a bus.

5. Method as claimed in claim 1, characterized in that the alarm signal is retrievable by an apparatus connectable to the measuring field-device.

6. Method as claimed in claim 2, characterized in that the reporting signal is issued by a display apparatus on, or in, the measuring field-device.

7. Method as claimed in claim 2, characterized in that the reporting signal is issued by an apparatus from the measuring field-device onto a bus.

8. Method as claimed in claim 2, characterized in that the reporting signal is retrievable by an apparatus connectable to the measuring field-device.

9. Method as claimed in one of the preceding claims 1 to 8, characterized in that the registered influencing variable influencing expected service life or ability of the measuring field-device to function is a physical variable.

10. Method as claimed in one of the preceding claims 1 to 8, characterized in that the registered influencing variable

influencing expected service life or ability of the measuring field-device to function is a calculated variable.

11. Method as claimed in one of the preceding claims 1 to 8, characterized in that the registered influencing variable influencing expected service life or ability of the measuring field-device to function is a statistical variable.

12. Method as claimed in one of the preceding claims 1 to 11, characterized in that the registered influencing variable influencing expected service life or ability of the measuring field-device to function is a temperature.

13. Method as claimed in one of the preceding claims 1 to 8, characterized in that the registered influencing variable influencing expected service life or ability of the measuring field-device to function is a moisture.

14. Method as claimed in one of the preceding claims 1 to 11, characterized in that the registered influencing variable influencing expected service life or ability of the measuring field-device to function is a vibration.

15. Method as claimed in one of the preceding claims 1 to 11, characterized in that the registered influencing variable influencing expected service life or ability of the measuring field-device to function is a force.

16. Method as claimed in one of the preceding claims 1 to 11, characterized in that the registered influencing variable influencing expected service life or ability of the measuring field-device to function is a pressure inside a measuring device housing of the measuring field-device.

17. Method as claimed in one of the preceding claims 1 to 11, characterized in that the registered influencing variable influencing expected service life or ability of the measuring

field-device to function is a concentration of undesired gases in the measuring device housing.

18. Method as claimed in one of the preceding claims 1 to 11, characterized in that the registered influencing variable influencing expected service life or ability of the measuring field-device to function is the number of switch-on events of the measuring field-device.

19. Method as claimed in one of the preceding claims 1 to 11, characterized in that the registered influencing variable influencing expected service life or ability of the measuring field-device to function is the number of voltage transients on lines connected with the measuring field-device.

20. Method as claimed in one of the preceding claims 1 to 11, characterized in that the registered influencing variable influencing expected service life or ability of the measuring field-device to function is the number of electrostatic discharges on the measuring field-device, its housing, or a probe or operating unit connected with the measuring field-device.

21. Method as claimed in one of the preceding claims 1 to 20, characterized in that different influencing variables influencing expected service life or ability of the measuring field-device to function are registered.

22. Method as claimed in one of the preceding claims 1 to 21, characterized in that the influencing variable, or influencing variables, influencing expected service life or ability of the measuring field-device to function are stored.

23. Method as claimed in claim 21, characterized in that a plurality of currently registered influencing variables are considered for determining probable service life or ability of the measuring field-device to function.

24. Method as claimed in claim 22, characterized in that at least one currently registered, and at least one stored, influencing variable are considered for determining probable service life or ability of the measuring field-device to function.

25. Method as claimed in one of the preceding claims 1 to 24, characterized in that the frequency of alarm signals in a certain period of time is considered for determining probable service life or ability of the measuring field-device to function.

26. Method as claimed in claim 22, characterized in that extreme values of the current and stored influencing variables and/or their frequency in a certain period of time are considered for determining probable service life or ability of the measuring field-device to function.

27. Method as claimed in claim 23, characterized in that the stored influencing variables are subjected to a trend analysis and that a remaining period of time until the reaching of a predetermined, probable service life of the measuring field-device is determined and output for determining probable service life or ability of the measuring field-device to function.

28. Method as claimed in claim 2, characterized in that the issued reporting signal contains information concerning a remaining period of time until the reaching of a point in time for maintenance work on a module or component of the measuring field-device or for a predicted replacement of the module or component.

29. Measuring field-device for process automation and process measurement technology and for registering at least one process variable of a process medium, which measuring field-device includes a measuring device housing with electronics accommodated therein, characterized in that the measuring field-device further comprises

- a mechanism for registering an influencing variable influencing expected service life, or ability of the measuring field-device, or a part, or module thereof, to function, wherein the influencing variable is not the process variable,
- a mechanism for comparing the measured influencing variable, or a variable derived therefrom, with a predetermined maximum, or minimum, allowable value for this influencing variable or the derived variable, and
- a mechanism for generating and issuing an alarm signal in the case of exceeding the maximum allowable value, or in the case of subceeding, or falling beneath, the minimum allowable value, of the influencing variable or the derived variable.

30. Measuring field device for process automation and process measurement technology and for registering at least one process variable of a process medium, which measuring field-device includes a measuring device housing with electronics accommodated therein, characterized in that the measuring field-device further comprises

- a mechanism for registering an influencing variable influencing expected service life, or ability of the measuring field-device, or a part, or module thereof, to function, wherein the influencing variable is not the process variable,
- a mechanism for determining, by means of a predetermined function and on the basis of the currently registered influencing variable, probable service life, or remaining period of time until the reaching of a point in time for maintenance work on the measuring field-device, or a part, or module thereof, and
- a mechanism for generating and issuing a reporting signal corresponding to the probable service life, or the remaining period of time until the reaching of a point in time for maintenance work on the measuring field-device, or a part, or module thereof.

31. Measuring field device as claimed in claim 29, characterized in that an alarm or display apparatus provided thereon or therein issues the alarm signal.

32. Measuring field device as claimed in claim 29, characterized in that it issues the alarm signal onto a bus connected to the measuring field-device.

33. Measuring field device as claimed in claim 29, characterized in that an apparatus is provided, to which an external apparatus is connectable, by means of which the alarm signal can be retrieved.

34. Measuring field device as claimed in claim 30, characterized in that a display apparatus provided thereon or therein issues the reporting signal.

35. Measuring field device as claimed in claim 30, characterized in that it issues the reporting signal onto a bus connected to the measuring field-device.

36. Measuring field device as claimed in claim 30, characterized in that an apparatus is provided, to which an external apparatus is connectable, by means of which the reporting signal can be retrieved.

37. Measuring field device as claimed in one of the preceding claims 29 to 36, characterized in that at least one additional sensor or transducer is provided for registering a physical variable, which is the influencing variable influencing the expected service life or ability of the measuring field-device to function.

38. Measuring field device as claimed in one of the preceding claims 29 to 36, characterized in that the influencing variable influencing the expected service life, or the ability of the measuring field-device to function, is calculated.

39. Measuring field-device as claimed in claim 37, characterized in that the additional sensor or transducer registers a temperature.

40. Measuring field-device as claimed in claim 37, characterized in that the additional sensor or transducer registers a moisture.

41. Measuring field-device as claimed in claim 37, characterized in that the additional sensor or transducer registers a vibration.

42. Measuring field-device as claimed in claim 37, characterized in that the additional sensor or transducer registers a force.

43. Measuring field-device as claimed in claim 37, characterized in that the additional sensor or transducer registers a pressure inside the measuring device housing of the measuring field-device.

44. Measuring field-device as claimed in claim 37, characterized in that the additional sensor or transducer registers a concentration of undesired gases in the measuring device housing.

45. Measuring field-device as claimed in one of the claims 29 to 36, characterized in that it registers the number of switch-on events of the measuring field-device and takes such into consideration as an influencing variable on expected service life or ability of the measuring field-device to function.

46. Measuring field-device as claimed in one of the preceding claims 29 to 36, characterized in that it registers voltage transients on lines electrically connected with it and takes such into consideration as an influencing variable on expected service life or ability of the measuring field-device to function.

47. Measuring field-device as claimed in one of the preceding claims 29 to 36, characterized in that it registers electrostatic discharges on the measuring field device, its housing or a probe or operating unit connected with it and takes such into consideration as an influencing variable on expected service life or functional ability.

48. Measuring field-device as claimed in one of the preceding claims 37 to 47, characterized in that different influencing variables influencing expected service life, or ability of the measuring field-device to function, are registered.

49. Measuring field-device as claimed in one of the preceding claims 29 to 48, characterized in that it includes a memory, wherein a currently registered influencing variable, or variables, influencing expected service life, or ability of the measuring field-device to function, is/are stored.

50. Measuring field-device as claimed in claim 48, characterized in that a plurality of currently registered influencing variables are considered for determining probable service life or ability of the measuring field-device to function.

51. Measuring field device as claimed in claim 49, characterized in that at least one currently registered, and at least one stored, influencing variable are considered for determining probable service life or ability of the measuring field-device to function.

52. Measuring field-device as claimed in one of the preceding claims 29 to 51, characterized in that frequency of alarm signals within a certain period of time period are considered for determining probable service life or ability of the measuring field-device to function.

53. Measuring field-device as claimed in claim 49, characterized in that extreme values of current and/or stored, influencing variables and/or their frequency within a certain period of time are considered for determining probable service life or ability of the measuring field-device to function.

54. Measuring field-device as claimed in claim 49, characterized in that, for determining probable service life or ability of the measuring field-device to function, stored influencing variables

are subjected to a trend analysis and a remaining period of time until the reaching of a predetermined probable service life of the measuring field-device is determined and output.

55. Measuring field-device as claimed in claim 30, characterized in that the issued reporting signal contains information concerning a remaining period of time until the reaching of a point in time for maintenance work on a module or component of the measuring field-device or concerning a probable replacement of the module or component.